

CLAIMS

1. A broadband non-resonant antenna device for wireless transmission of information using electromagnetic signals, comprising a metal sheet layer (2), forming a plane, with a slotline (3) that comprises a first part (3a) and a second part (3b), where the side of the second part (3b) that is the most distant from the first part (3a) transcends into a widening open-ended tapered slot (6) in the metal sheet layer (2), characterized in that the device additionally comprises a feeding line (4) in the metal sheet layer (2), which feeding line (4) comprises a feeding part (7), with a first end (7a) and a second end (7b), and gaps (8, 9) separating the feeding part (7) from the surrounding metal sheet layer (2) by a certain distance, where the slotline (3) is intersected by the feeding line (4).
2. Antenna device according to claim 1, characterized in that the feeding part divides the slotline (3) into the first part (3a) and the second part (3b) of the slotline (3).
3. Antenna device according to claim 1 or 2, characterized in that the first end (7a) of the feeding part (7) is connected to the metal sheet layer (2) after having intersected the slotline (3).
4. Antenna device according to any of the preceding claims, characterized in that the tapered slot (6) has an exponential form.
5. Antenna device according to any of the preceding claims, characterized in that the side of the first part (3a) of the slotline (3) that is the most distant from the second part (3b) transcends into an essentially two-dimensional cavity (5).

6. Antenna device according to claim 5, characterized in that the essentially two-dimensional cavity (5) has a circular form.

7. Antenna device according to any of the claims 1 to 4,
5 characterized in that the side of the first part (3a) of the slotline (3) that is the most distant from the second part (3b) is short-circuited to the metal sheet layer (2).

8. Antenna device according to any of the preceding claims,
10 characterized in that the first end (7a) of the feeding part (7) is positioned past the slotline (3), with the gaps (8, 9) continuing at each of the sides of the feeding part (7).

9. Antenna device according to claim 8, characterized in
15 that the gaps (8, 9) are joined at the first end (7a) of the feeding part (7).

10. Antenna device according to claim 9, characterized in
that the joining part of the gaps (8, 9), at the first end (7a) of the feeding part (7), forms an essentially two-dimensional cavity (11).

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11. Antenna device according to any of the preceding claims,
characterized in that the second end (7b) of the feeding part extends to an edge (2') of the metal sheet (2).

25 12. Antenna device according to any of the claims 1-6,
characterized in that an external feeding (19, 20, 55) is attached to the second end (7b) of the feeding part (7).

13. Antenna device according to any of the preceding claims,
30 characterized in that electrical contact is obtained between those ground planes (61, 62) that surround the centre conductor (7) near the position where the centre conductor (7) intersects the slotline (3).

14. Antenna device according to any of the preceding claims, characterized in that said electrical contact is obtained by means of a metal bridge (63, 63', 64).
- 5 15. A broadband non-resonant array antenna comprising a plurality of similar antenna devices (1a, 1b, 1c), for wireless transmission of information using electromagnetic signals, characterized in that at least one of the included antenna devices (1a, 1b, 1c) has the features described in any one of the claims 1-14.
- 10 16. Array antenna according to claim 15, characterized in that the antenna devices (1a, 1b, 1c) are positioned beside each other on the metal sheet layer (23).
- 15 17. Array antenna according to claim 16, characterized in that a plurality of metal sheet layers (23), comprising the antenna devices (1a, 1b, 1c) positioned beside each other, are placed in a plurality of rows (26a, 26b, 26c).
- 20 18. Array antenna according to any one of the claims 15-17, characterized in that for each included antenna device (1a'; 1a, 1b, 1c), one orthogonally arranged antenna device (1a"; 30, 31, 32) is arranged.
19. Array antenna according to any one of the claims 15-18, characterized in that the external feeding comprises at least one feeding module (19, 20, 55) of an active or a passive type connected to at least one of the antenna devices (1a, 1a', 1a", 1b, 1c, 30, 31, 32, 56, 57).
- 25 20. Array antenna according to claim 19, characterized in that the at least one feeding module (19, 20, 55) comprises a variable phase-shifter and/or power attenuators.
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21. Array antenna according any one of the claims 19 or 20, characterized in that the at least one feeding module (19, 20, 55) may be connected to a control unit for power and phase control.
- 5 22. Array antenna according any one of the claims 19-21, characterized in that the at least one feeding module (19, 20, 55) is electromagnetically coupled to at least one of the antenna devices (1a, 1a', 1a'', 1b, 1c, 30, 31, 32 56, 57).
- 10 23. Array antenna according any one of the claims 18-22, characterized in that the at least one feeding module (19, 20, 55) is arranged to feed the at least one antenna device (1a, 1a', 1a'', 1b, 1c, 30, 31, 32, 56, 57) in such way that circular polarization is obtained.